Below is an explanation concerning the equation used by MCDOT to define material requirements for imported fill – as requested during the March 5th meeting.

Hi Bob,

This equation is based on the ADOT subgrade acceptance chart, to achieve subgrade support for a typical Maricopa County subgrade. It is intended to be used for imported subgrade placed beneath pavements. The standard spec's had some requirements for max agg size and others, but did not have any sieve or PI requirements. Pavement designers were frequently not making recommendations for import soil requirements beneath pavements, and we had contractors importing soils that were of lower quality than what was anticipated in the pavement thickness design. Those requirements should be overridden by special provisions if the subgrade import is handled properly in the pavement design, and development of the project spec's.

We created the spec after I got multiple engineers telling me that whatever MAG required for subgrade quality would be fine for the pavement subgrade or other imported soil requirements. It turns out that most of the Maricopa County engineers and their consultants just expected that MAG (or the County standards) would have some minimum level of quality (as measured by sieve and PI) for acceptance. I chose to let the pavement design parameters establish the standard, since that seems to be the most critical.

The values are a little conservative and it takes a pretty good quality subgrade soil to pass. I would expect that a contractor would have to search a bit to find a source that would meet this. It may be a little strict as a general fill requirement. My thought was that we could back off the spec if there were specific job requirements that were less critical, like at the bottom of deep fills or in non structural or non pavement areas.

Additionally, I was working to get geotechnical engineers and pavement designers to incorporate gradation and PI requirements into the special provisions so these standard requirements would be overridden by something that a designer established to be appropriate for the specific needs of the project. I was not comfortable having no backstop there when that didn't happen.

One more point. I like the idea of having an equation instead of just a sieve and PI requirement because it gives more flexibility for soils. For example, if we had a soil with a PI of 17, but only 12 percent passing the #200, it would probably be a decent soil for fill because there is not much clay in it. That PI would not pass many standard specs for import soil that are based on a set PI (like 10 max or 15 max), but the fact that the #200's are so low make it ok.

Hope this helps.

Joe Phillips

From: Robert Herz - MCDOTX [mailto:rherz@mail.maricopa.gov]
Sent: Thursday, April 24, 2008 5:05 PM
To: Phillips, Joseph A
Subject: MAG Specifications & Details Committee question.

Joe,

The MAG Specifications & Details Committee is working toward consolidating various agency supplemental requirements into the MAG specs and details. You assisted in providing the county

with the supplemental requirements for borrow material. Various committee members would like to know the basis for the equation. Would you provide a brief explanation of how the equation was developed?

Borrow material for fill construction shall meet the following requirement:

The Plasticity Index (PI) (AASHTO T90) and the percent passing the number 200 sieve (Minus 200) (ASTM C136) when used in the equation below, shall give a value of X that does not exceed 62.

$$X = (\text{Minus } 200) + 2.83\ (PI)$$

When the percentage of the Minus 200 material is greater than 30, the PI for the soil shall be at least 5 and at the same time incompliance with the X value requirement.

Thanks,

Bob